



CAFB 97

DEPARTMENT OF THE AIR FORCE

HEADQUARTERS 27th FIGHTER WING (ACC)
CANNON AIR FORCE BASE, NEW MEXICO

17 JUL 1997

Lt Colonel James A. Thomas III, USAF
Commander, 27th Support Group
110 E. Sextant Avenue, Suite 1098
Cannon AFB NM 88103-5323




Mr. Benito J. Garcia, Chief
Hazardous and Radioactive Materials Bureau
New Mexico Environment Department
P O Box 26110
Santa Fe NM 87502

Dear Mr. Garcia

Attached, for your review, is the Site Inspection Report for Area of Concern D located on the golf course at Cannon Air Force Base.

If you have any questions, please contact Mr. Sanford Hutsell at (505) 784-6378.

Sincerely


JAMES A. THOMAS III, Lt Col, USAF
Commander, 27th Support Group

Attachment:
Site Inspection Report

cc: *w/o Atch*
NMED (C. Will)
NMED Groundwater Bureau (J. Jacobs)
EPA Region VI (D. Neleigh)
HQ ACC CES/ESVW w/o Atch (M. Patterson)

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FINAL

SITE INSPECTION (SI) REPORT

**AREA OF CONCERN - D
CANNON AIR FORCE BASE
NEW MEXICO**



**CONTRACT NO. DACW45-94-D-0049
DELIVERY ORDER NO. 0004**

JUNE 25, 1997

PREPARED FOR:

**U.S. ARMY CORPS OF ENGINEERS
OMAHA DISTRICT
OMAHA, NEBRASKA**

ATTN: MR. STEVE PETERSON

PREPARED BY:

**IMS, P.C.
ENVIRONMENTAL & ENGINEERING
115 METRO PARK
ROCHESTER, NY 14623
TEL: (716) 427-0690**

IMS P.C.
ENVIRONMENTAL & ENGINEERING

115 Metro Park
Rochester, New York 14623

Tel: 716-427-0690 Fax: 716-427-0012

June 25, 1997

Mr. Steve Peterson
U.S. Army Corps of Engineers
Omaha District
215 N. 17th Street
Omaha, NE 68102

RE: Site Inspection
Area of Concern (AOC) - D
Cannon Air Force Base, NM
Contract No. DACW45-93-D-0049

Dear Mr. Peterson:

IMS is pleased to submit the Draft Site Inspection Report for the Area of Concern - D, Cannon Air Force Base, New Mexico. Six copies of the Draft Report are enclosed.

Please call us at 716-427-0690 should you have any questions or comments.

Sincerely,



Praveen Srivastava, Ph.D.
Project Manager

Enclosures

c: Sanford Hutsell, 27CES/CEV
Cannon AFB, NM (5 copies)

Margaret Patterson, ACC CES/ESVW
Langley AFB, VA (2 copies)

Missouri River Lab
Omaha, NE (1 copy)

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LIST OF ABBREVIATIONS AND ACRONYMS

ACC	Air Combat Command
ACM	Asbestos Containing Material
AFB	Air Force Base
AOC	Area of Concern
APR	Air Purifying Respirator
BEC	Base Environmental Coordinator
°C	Degree Centigrade
CFR	Code of Federal Regulations
CIH	Certified Industrial Hygienist
CLP	Contract Laboratory Program
COC	Chain-of-Custody
DQCR	Data Quality Control Report
°F	Degree Fahrenheit
FSP	Field Sampling Plan
GC/MS	Gas Chromatograph/Mass Spectrometer
gpm	Gallons per minute
HEPA	High Efficiency Particulate Air
HSA	Hollow Stem Auger
HQ	Headquarters
HTW	Hazardous and Toxic Waste

LIST OF ABBREVIATIONS AND ACRONYMS

ID	Inside diameter
IDL	Instrument Detection Limit
IDW	Investigation Derived Waste
IMS	IMS, P.C. Environmental & Engineering
LCS	Laboratory Control Sample
MDL	Method Detection Limit
MRD	Missouri River Division
MS	Matrix Spike
MSD	Matrix Spike Duplicate
MSL	Mean Sea Level
OB&G	O'Brien & Gere
OVA	Organic Vapor Analyzer
PARCC	Precision, Accuracy, Representativeness, Completeness, Comparability
PACM	Presumed Asbestos Containing Material
PCM	Phase Contrast Microscopy
PEL	Permissible Exposure Limit
PID	Photoionization Detector
PPE	Personal Protective Equipment
QA	Quality Assurance

LIST OF ABBREVIATIONS AND ACRONYMS

QAPP	Quality Assurance Project Plan
QC	Quality Control
QCSR	Quality Control Summary Report
RPD	Relative Percent Difference
SB	Soil Boring
SDG	Sample Delivery Group
SI	Site Inspection
SOP	Standard Operating Procedure
SSHP	Site Safety and Health Plan
SVOC	Semivolatile Organic Compound
TAL	Target Analyte List
TCL	Target Compound List
TFW	Tactical Fighter Wing
TM	Technical Manager
TRPH	Total Recoverable Petroleum Hydrocarbons
TWA	Time Weighted Average
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
W-C	Woodward-Clyde
VOC	Volatile Organic Compounds

EXECUTIVE SUMMARY

IMS Environmental & Engineering (IMS) completed a Site Inspection (SI) of Area of Concern-D (AOC-D) at the Cannon Air Force Base, New Mexico. Site AOC-D was originally described as a pit, approximately 10 feet deep and underlying the tee box and fairway of Hole #7 of the Base golf course. The pit was reportedly used for the disposal of demolition debris, mixed with presumed asbestos containing material (PACM), derived from a large number of buildings at the Base that were demolished during the mid-1950s. The primary objective of the SI was to evaluate contamination of soil by asbestos, and to explore the possibility of any contamination by organic and inorganic chemicals.

A geophysical survey was conducted at the AOC-D to determine the presence or absence of any metal containers (contaminant sources) that may have been disposed of in the pit along with demolition debris. The geophysical survey indicated that no metal containers were buried at AOC-D.

Subsurface drilling was completed at 6 locations as proposed in the Final Work Plan (IMS, 1996). No visible PACM was encountered down to a depth of 10 feet at any of these locations and thus no soil samples were collected. Three new locations were chosen for additional drilling in consultation with the Base and the U.S. Army Corps of Engineers. Drilling at 2 of these locations down to a depth of 10 feet did not indicate the presence of visible PACM. Non-friable PACM (most likely building wall siding board) chips were observed at one of the locations (SB-08) within 1 foot of the surface. A sample of this material was obtained. Drilling was continued to a depth of 25 feet but no visible asbestos or other contamination was observed below the 1 foot depth. Results of headspace screening, completed at 2 foot intervals, were at or below background levels. Soil samples were collected at depths of 7, 15 and 25 feet from SB-08 and were analyzed for Target Compound List (TCL) volatile organic compounds (VOCs), TCL semivolatile organic compounds (SVOCs), Target Analyte List (TAL) metals and Total Recoverable Petroleum Hydrocarbons

(TRPH).

All organic analytes were nondetects. Several metals were detected at concentrations above reporting limits. A comparison of metal concentrations with USEPA Region 6 Media Specific Screening Levels (USEPA, 1996) indicated that metal concentrations were either within the range of background concentrations or were below the screening levels.

In addition to the sample from SB-08, one sample of PACM was collected from the ground surface near SB-06. Both these samples were analyzed for their asbestos content. The sample collected from borehole SB-08 at 1 foot depth contained 20% asbestos and the surface sample contained 5% asbestos.

In summary, the SI completed at AOC-D did not indicate the presence of a debris pit at the site and indicated no contamination of the site by organics or inorganic (metal) contaminants. However, the siding board chips, collected from the surface and from shallow depth (1 foot) at one of the borings, were found to contain asbestos. The asbestos is of non-friable type and the occurrence of asbestos at the site appears to be of sporadic nature, with some chips lying on the ground surface and some buried at shallow depths. Although asbestos contained in the siding board chips poses no immediate danger to human health, removal of chips present on the ground surface is recommended to eliminate potential for future exposure.

2.1 INTRODUCTION

IMS Environmental & Engineering (IMS) completed a Site Inspection (SI) at Area of Concern - D (AOC - D) at Cannon Air Force Base (AFB), New Mexico. The SI included a geophysical survey, drilling of 9 soil borings, and collection and analysis of subsurface soil samples. This report presents results of the SI, including a description of the site location, background and setting; a discussion of geophysical and analytical results; and an evaluation of physical and chemical data acquired during the SI.

2.2 PROJECT OBJECTIVES

Objectives of the SI completed at AOC-D at Cannon AFB were:

- Confirm that the PACM actually contained asbestos. The objective was also to evaluate the nature and extent of soil contamination by asbestos, if found in the PACM.
- Determination of the presence or absence of any buried contaminant sources (e.g. drums)
- Determination of nature and extent of soil contamination by any organic or inorganic chemicals other than asbestos.

The following tasks were completed to provide data to achieve these objectives:

- Records review and evaluation

- Visual site inspection
- Preparation of a Field Sampling Plan (FSP), a Quality Assurance Project Plan (QAPP) and a Site Safety and Health Plan (SSHP).
- Completion of a geophysical survey to determine the presence or absence of metal containers (e.g. drums) that may have contained chemicals.
- Drilling of 9 soil borings. Sampling and chemical analyses of 3 soil samples.
- Sampling of any visible PACM from boreholes during drilling operations. Analyses for the type and amount of asbestos in the samples.
- Sampling of PACM chips lying on the surface and analysis for the type and amount of asbestos.

2.3 SITE LOCATION, HISTORY AND SETTING

2.3.1 SITE LOCATION

The SI was completed at AOC - D which reportedly consists of an old pit currently located within the base golf course. According to Cannon AFB and USACE personnel, the pit is located under the fairway and tee box of the 7th hole (FIGURE 2-1). The pit was reportedly used for disposal of debris, potentially containing asbestos, derived from demolition of a large number of buildings at the Base during the mid-1950s. The site was discovered during a construction project to expand the base golf course from 9 to 18 holes. During that project, a bulldozer operator was pushing dirt into mounds that would be formed into tee-boxes and bunkers. The bulldozer removed about one foot of topsoil and exposed an area of non-friable asbestos debris. The asbestos debris was reportedly

pushed to the side, but was later placed between soil layers within the tee box. Chips of PACM, which appeared to be approximately 2" x 2" pieces of building wall siding board, were visible on the ground to the south of the tee box and the fairway at the time of the SI. The full lateral extent of the asbestos pit and soil contamination by asbestos were unknown prior to the SI. The maximum estimated thickness of the asbestos debris was 10 feet. The objective of the SI was to evaluate the vertical and lateral (if possible) extent of the asbestos debris; to determine the presence or absence of any potential contaminant sources (e.g. drums) with the help of geophysical methods; and to assess the nature and extent of any contamination by VOCs, SVOCs, metals, and TRPH.

2.3.2 CANNON AFB OPERATIONAL HISTORY

Cannon AFB is located in Curry County, New Mexico, approximately 7 miles west of the city of Clovis. The Base is situated on approximately 4,320 acres of land. The vicinity and site map of Cannon AFB is shown on FIGURE 2-1. Off-Base facilities include the Melrose Air Force Range (MAFR).

Cannon AFB dates back to 1929, when Portair Field was established on the site. Portair Field was a civilian passenger terminal for early commercial transcontinental flights. In 1942, the Army Air Corps took control of the civilian airfield and it became known as the Clovis Army Air Base. In early 1945, the Base was renamed Clovis Army Air Field. Flying, bombing, and gunnery classes continued through the end of World War II. By mid-1946, however, the airfield was placed on a reduced operational status and flying activities decreased. The installation was deactivated in May 1947. The types of aircraft stationed at Cannon AFB from 1942 to 1947 included B-17, B-24, and B-29 heavy bombers.

The Base was reassigned to the Tactical Air Command in July 1951. The first unit, the 140th Fighter-Bomber Wing, arrived in October of that year. The airfield was formally activated in November 1951 as Clovis Air Force Base. Between 1952 and 1957, the 50th and 388th Fighter-Bomber Wings were activated and, upon their transfer, were replaced by the 312th and 474th

Groups. Predominant aircraft stationed at Cannon AFB from 1951 to 1957 included the P-51 "Mustang" fighter and the F-86 "Sabre" fighter jet.

In June 1957, the Base became a permanent installation and was renamed Cannon Air Force Base in honor of the late General John K. Cannon, a former commander of the Tactical Air Command. In October 1957, the 312th and 474th Fighter-Bomber Groups were redesignated tactical fighter wings and 832nd Air Division was activated to oversee their activities.

In 1959, the 312th Tactical Fighter Wing (TFW) was deactivated and replaced at Cannon AFB by the 27th TFW. In December 1965, the Base's mission changed to that of a replacement training unit, and the 27th TFW became the largest such unit in the Tactical Air Command. The predominant aircraft stationed at Cannon AFB from 1957 to 1965 was the F-100 "Super Sabre" fighter jet.

The 832nd Air Division was deactivated in July 1975, leaving the 27th TFW the principal Air Force unit at Cannon AFB. In early 1981, the 27th TFW was designated a Rapid Deployment Joint Task Force member.

The primary mission of Cannon AFB has remained relatively unchanged since 1965, i.e., to develop and maintain an F-111 tactical fighter wing capable of day, night, and all-weather combat operations and to provide replacement training of combat aircrews for tactical organizations worldwide. Aircraft stationed at Cannon AFB since 1965 include the F-100 "Super Sabre" fighter jet (1857-1969), the F-111A (1969), the F-111E (1969-1971) and the F-111D (1971-present). There are approximately 70 F-111D aircraft assigned to Cannon AFB. The total work force on Cannon AFB numbers approximately 4,000, which includes 3,500 military and 450 civil service.

In 1992, Cannon AFB became part of the Air Combat Command (ACC) as a result of the overall realignment of Air Force Commands and the ongoing downsizing of the U.S. military. At present, the 27th Fighter Wing has three squadrons of the F-16 aircraft and one squadron of the F-111E aircraft at the Cannon AFB. The F-111E aircrafts are being phased out over the next few years,

which will leave only F-16 aircrafts at the Base.

2.3.3 PHYSIOGRAPHY

Cannon AFB is situated in the Southern High Plains Physiographic Province in the Llano Estacado subprovince. The Llano Estacado is a nearly flat plain sloping gently (10 to 15 feet per mile) to the east and southeast. Elevations in the eastern New Mexico portion of the Llano Estacado exceed 4,000 feet above mean sea level (MSL). In the vicinity of Cannon AFB, elevations range from 4,250 feet to 4,350 feet above MSL.

The most prominent geomorphic features in the vicinity of Cannon AFB are blowouts and broad, widely spaced valleys. Less common landforms are relict sand dunes located along the northeast side of the Portales Valley south of the Base. Relict dunes are not found on or near Cannon AFB.

Blowouts are broad shallow depressions which form as a result of soil erosion by wind. Blowouts commonly collect surface runoff from small to moderate sized drainage areas. During periods of rainfall, runoff collects in blowouts to form ephemeral playa lakes. Playas have no external surface drainage. Water is lost by infiltration to the soil and evaporation; without recharge, playa lakes persist for only a few days or weeks. Three playas are located within the Base, and several more are found to the north and east of the Base.

Stream valleys tend to be fairly broad and widely spaced. Streams are ephemeral and drainages are poorly developed. No streams exist on or near Cannon AFB. Running Water Draw and Frio Draw, located about 10 and 20 miles, respectively, north of Cannon AFB, are the nearest streams. These are second-order streams. Both streams are very straight, flow southeast, and have rectilinear drainage patterns with short laterals.

2.3.4 DEMOGRAPHICS AND LAND USE NEAR CANNON AFB

Cannon AFB is located just south of U.S. Highway 60-84 in a farming and ranching area. The majority of the land surrounding Cannon AFB is productive, irrigated farmland or grassland. The major crops are wheat, sorghum, sugar beets, corn, cotton, alfalfa, barley, and peanuts. The land is also used for cattle grazing, both for beef and dairy. Clovis is considered the "Cattle Capital of the Southwest." There were 32,767 people living in Clovis in 1990, while the Cannon AFB population was estimated to be 4,650 in 1990 (W-C 1991).

2.3.5 CLIMATE

The climate of east-central New Mexico is classified as tropical semiarid, with summer temperature and precipitation maxima. Average monthly temperatures range from a January low of 12°C (39°F) to a July high of 26°C (78°F). Extreme daily temperatures range from minus 24°C (minus 11°F) to 41°C (106°F) (Lee Wan and Associates 1990). Average monthly precipitation ranges from 1 cm (0.4 inches) in winter to 6.9 cm (2.7 inches) in July (AWS 1986). The maximum recorded 24-hour rainfall is 12.2 cm (4.8 inches), which occurred in August. Rainfall occurs on eight or more days per month during the summer precipitation maximum. Mean annual precipitation is approximately 41 cm (16 inches). The mean annual evapotranspiration rate is 181.4 cm/yr (71.4 inches/yr) (Lee Wan Associates 1990). Prevailing winds are from the west at an average of 5 km/hr (3.1 mph) during fall, winter, and spring. During the summer, winds are from the south at an average of 3.7 km/hr (2.3 mph).

Dust is frequently entrained into the atmosphere in this region because of gusty winds and the semiarid climate. The Texas Panhandle and eastern New Mexico area is considered the worst area in the United States for windblown dust. Occasionally, this windblown dust is of sufficient quantity to restrict visibility. Most of the seasonal dust storms occur in March and April, when the wind speeds are typically high (average 5 km/hr) (W-C 1991).

2.3.6 GEOLOGY

The near-surface stratigraphic units of interest at Cannon AFB are the Late Miocene-Late Pliocene-age Ogallala Formation and the Early Triassic Dockum Group as shown in FIGURE 2-2.

The Dockum Group consists of three formations. The stratigraphically lowest unit is the Santa Rosa Sandstone. Overlying the Santa Rosa Sandstone are the Chinle and Redonda Formations. The Chinle and Redonda Formations are composed mainly of red shales with lesser interbedded sands, and are known locally as "redbeds." The top of the Dockum Group is marked by an erosional nonconformity having relief of up to several hundred feet (Lee Wan and Associates 1990).

Overlying the Dockum Group redbeds is the Ogallala Formation. The Ogallala Formation extends from eastern New Mexico and Colorado into Texas, Oklahoma, Kansas, Nebraska and South Dakota. Drillers' logs from Cannon AFB indicate that the Ogallala Formation varies from 360 feet to 415 feet in thickness (FIGURE 2-2). The incised upper surface of Triassic redbeds strongly influences Ogallala thickness. Stream valleys in the post-Triassic unconformity are deep and tend dominantly east-west. Ogallala thickness may thus vary significantly over short north-south distances.

The Ogallala is erosionally truncated to the south along the abandoned Portales Valley, to the west along the Pecos River Valley, and to the north in a series of ephemeral stream valleys. The Ogallala Formation extends more than 125 miles to the east before terminating as an escarpment in Briscoe County, Texas. Springs and seeps are common along the erosional margins of the Ogallala.

The Ogallala dips gently and monoclinally to the southeast in the vicinity of Cannon AFB. As reported in Lee Wan and Associates (1990), data suggest that some Quaternary warping may have occurred; however, most of the structures are well to the northwest and southwest of Cannon AFB. No faults or buried structural lineaments are known in the vicinity of Cannon AFB.

The Ogallala Formation is composed of unconsolidated poorly sorted gravel, sand, silts, and clays.

The base of Ogallala is generally marked by a gravel, cobble, and boulder deposit. This basal member contains sediments derived from igneous and sedimentary rocks transported from the mountains to the west. The Ogallala Formation was laid down as stream and overbank deposits formed within coalescing alluvial fans. These fans form a broad pediment along the eastern flank of the Rocky Mountains. As is typical of alluvial deposits, Ogallala internal stratigraphy varies vertically and horizontally over short distances.

Caliche is a major feature of the Ogallala Formation, occurring as nearly continuous to discontinuous layers throughout. Caliche is hard, white to pale tan on fresh surfaces, weathering to gray, and has a chalky appearance. Caliche forms as calcium carbonate, leached from overlying sediments, precipitates in pore spaces of the host sediments. Precipitation is caused by the evaporation of downward percolating water. The caliche may thus mark the position of ancient vadose zones. As reported in Lee Wan and Associates (1990), radiocarbon dates for the upper "climax" caliche range from approximately 27,000 years to approximately 42,000 years.

Caliche is relatively soluble in acidic water ($\text{pH} < 7$) or in waters containing dissolved CO_2 . The top surface of the upper "climax" caliche in fresh outcrop shows solution etching.

The Ogallala has numerous continuous to discontinuous caliche layers throughout its thickness. The uppermost caliche, termed the "climax" caliche, is pisolitic (consisting of spherical concentrically laminated aggregates 1 to 10 mm in diameter (Lee Wan and Associates 1990)). The pisolites are thought to have formed as the caliche was repeatedly chemically-weathered and brecciated during Pleistocene pluvials (wet climate episodes) and later recemented during drier intervals. This upper caliche crops out around playas and the bounding escarpments of the Ogallala, and is locally termed "caprock". The "climax" caliche is typically 3 to 5 feet thick. Caliches which occur lower in the Ogallala are platy and harder. Caliche may be thin or absent below playas (W-C 1991).

2.3.7 HYDROGEOLOGY

The lower portion of the Ogallala Formation is the primary regional aquifer for both potable and irrigation water. No deeper aquifers are utilized in the vicinity of Cannon AFB. The Ogallala aquifer is part of the High Plains Aquifer which extends continuously from Wyoming and South Dakota into New Mexico and Texas. In east central New Mexico, the Ogallala aquifer rests on Dockum Group redbeds, which serve as the basal confining layer. The Ogallala is a water table, or unconfined, aquifer (Lee Wan and Associates 1990). The Ogallala aquifer has a southeasterly regional gradient of about 13 feet/mile. Well yields vary from less than one gallon per minute (gpm) in thin silts and sands, and up to 1,600 gpm in thick sands and gravels (Lee Wan and Associates 1990). Water quality is generally good, with the exception that hardness and fluorides are somewhat high (Lee Wan and Associates 1990).

At Cannon AFB, the depth to groundwater is greater than 200 feet, and the Ogallala aquifer has an average saturated thickness of 120 feet based on mid-1960s data. Saturated thickness ranges from 93 to 143 feet, and is influenced by the configuration of the erosional nonconformity surface marking the top of the Dockum Group. The local groundwater gradient is southeasterly at 7.5 feet/mile (Lee Wan and Associates 1990).

Recharge to the Ogallala is primarily through precipitation. Lee Wan and Associates (1990) reported that the recharge rate may be as much as 1.0 inch/year. Due to the high evapotranspiration rate and low precipitation, recharge probably occurs only during heavy rainfall events in which the infiltration capacity of the soil is exceeded and runoff occurs, or during cool months when precipitation exceeds evapotranspiration. Excess runoff flows to playas, and the presence of water in playas may allow deep percolation to the aquifer. The occurrence of this process is evidenced by the presence of clay deposits in, and thin or nonexistent caliche layers directly below, playas. Caliche is soluble in acidic rain waters, and is leached over time to form percolation pathways.

Discharge from the Ogallala occurs through well pumping and springs along the eroded margins of

the formation. Spring discharge does not occur on or near Cannon AFB. Domestic and irrigation water wells are common at and around the Base. The rate of discharge exceeds the rate of recharge. Water levels in the Ogallala have declined steadily from the 1930s to the present. A decline of 50 to 100 feet has been reported for the period from the 1930s to 1980 in the area around Clovis, New Mexico.

The dominant uses of ground water in the Cannon AFB area are for drinking and irrigation purposes. Numerous wells are found in the Cannon AFB area, most of which provide only irrigation water.

2.3.8 SOILS

Soils in the vicinity of Cannon AFB are classified as silty sand (SM) to clayey sand (SC) under the Unified Soil Classification System, and as aridisols (calciorthids) under the United States Department of Agriculture - Soil Conservation Service (USDA-SCS) Comprehensive Soil Classification System. The following summary is based on the Curry County Soil Survey as reported in Lee Wan and Associates (1990).

The most common soil type on the base is the Amarillo fine sandy loam, 0 to 2 percent slope phase. This soil consists of a thin sandy A horizon, well defined clayey B₁₋₃ horizons, with a calcic B₃ horizon at depths below 40 inches. The calcic B₃ horizon lies on a calcic C horizon, or on caliche. The color of the surface soil is brown (7.5 YR 5/5, dry) and subsurface soils are reddish-brown (5 YR 4/4, dry) to yellowish-red (15 YR 5/6, dry). The calcic C horizon underlying the Amarillo Fine Sandy loam is white in color. The Amarillo fine sandy loam soil type is present on all relatively flat surfaces at the base but is also found on slopes associated with playas. A small area of Amarillo loamy fine sandy 0 to 2 percent slope phase is mapped in the southeast corner of the base.

Clovis fine sandy loams, 0-2 percent slope phase and 2-5 percent slope phase, are similar to Amarillo fine sandy loams. Clovis soils are reddish-brown on the surface and in the subsurface, with a white Calcic C horizon. In the Clovis soils, the depth to the calcic C horizon ranges from 28 to 56 inches.

The depth to caliche exceeds 56 inches. Clovis and Amarillo fine sandy loams occur in close association.

In a few limited areas, particularly along the steeper slopes around playas, Mausker fine sandy loam, 0 to 2 percent slope phase, and 2 to 5 percent phase are found. Mausker fine sandy loams have no B horizons and are very calcareous. Mausker fine sandy loam soils are brown (10 YR 5/3, dry) to light brown (7.15 YR 6/4, dry) at the surface with a pink to reddish-yellow (7.5 YR 7/5, dry) calcic C horizon. Associated with the Mausker fine sandy loam soils around the base Playa Lake are Potter fine sandy loam soils, 0 to 5 percent slope phase. This soil typically has a thin A horizon, greyish brown (10 YR 5/2, dry) in color, with no B horizon; similar to Mausker soils. Potter soils are shallow and strongly calcareous, and overlie hard consolidated caliche. The calcic C horizon is within two feet of the surface.

The A and B horizons of Amarillo and Clovis fine sandy loams are rapidly to moderately permeable. Mausker fine sandy loam A and Ac horizons are rapidly permeable. Permeabilities in calcic B and C horizons are moderate.

2.3.9 BIOLOGICAL RESOURCES

Land adjacent to Cannon AFB is primarily used for agriculture and little natural vegetation remains in the area. The wildlife species that are common to agricultural areas throughout the region include bobwhite quail and pheasant. The few playa lakes in the area are used by upland game for cover, by waterfowl for resting and feeding, and by wildlife in general for drinking. Nearby riverbeds also provide water sources during rainy seasons. During periods of low rainfall, the riverbeds are dry.

2.3.9.1 PLANT RESOURCES

The climate of the Base area is considered to be semiarid. The thin layer of topsoil in the vicinity of Cannon AFB is sandy loam, which is highly susceptible to wind erosion. The undisturbed natural

vegetation is mostly shortgrass prairie, including blue grama grassland and mixed grama grassland vegetation types, which have moderately fast recovery rates.

Much of the study area has been previously cleared for agricultural crops. The predominant land use of the region is rangeland, primarily for cattle grazing. In general, moderately grazed rangeland areas of the types occurring in the project area are highly productive in terms of both forage quality and quantity. The rangeland in the vicinity may support up to 15 to 20 head of cattle per section, depending on the rainfall. Large trees do not uniformly exist in the vicinity of the range except where planted around buildings and other structures on the Base. Woodlands composed of large shrubs and small trees are confined to riparian areas and playa lakes in the vicinity.

The following plants are candidate species for the Federal List of Endangered and Threatened Wildlife and Plants, and are found within a 50-mile radius of Cannon AFB: chatterbox orchid (*Epipactus gigantea*), spiny aster (*Aster harridus*), Whittmans milkvetch (*Asragalus witmanii*), dune unicorn plant (*Proboscidea sabulosa*), and the tall plains spruce (*Eupjorbia strictior*). The dune unicorn plant is also on the state endangered plant species list. No federally protected endangered plants are known to grow on the Base (Lee Wan and Associates, 1990).

2.3.9.2 WILDLIFE RESOURCES

The eastern New Mexico area contains many nongame wildlife species that are typical of the High Plains. Most of these species are distributed widely throughout the western United States. Species diversity is low in most habitats because of the low vegetation diversity. Most amphibian species are associated with riparian habitats and playa lakes. Reptiles are found in all terrestrial habitat types but are most abundant in scrub/grasslands. Nocturnal rodents are the most abundant members of the small mammal community.

Grasslands on the High Plains support a variety of seed-eating sparrows and other ground-dwelling birds, both as residents and migrants. Raptors (hawks and owls) are relatively abundant in all

habitats in the region. Insectivorous and tree-nesting species are most abundant in riparian areas. Shorebirds, waterbirds and migratory waterfowl in general use the rivers, playa lakes, and reservoirs of the region.

Two National Wildlife Refuges (NWRs) are located on the periphery of the Base area. The Grulla and Muleshoe NWRs are within 30 miles of Cannon AFB. These areas provide high-quality habitat for migratory and breeding waterfowl.

Big-game species in the area include mule deer, white-tailed deer, pronghorn, and barbary sheep. Pronghorn is the most abundant game animal in the area. Several species of upland game such as quail, ring-necked pheasant, and turkey are common in the area. Reservoirs (Ute Lake, Conchas Lake, and Clayton Lake) and playa lakes are important waterfowl habitats in the region. Numerous species of native and introduced fish inhabit the rivers, perennial streams, and reservoirs and support recreational fishing of warm-water species such as walleye, crappie, channel catfish, largemouth bass, and bluegill.

As determined by the regional office of the U.S. Fish and Wildlife Service, two federally listed endangered animal species, the bald eagle and peregrine falcon, are known to inhabit the area within a 50-mile radius of Cannon AFB. The New Mexico Department of Game and Fish also indicated that the state endangered Mississippi kite, Baird's sparrow, and the black-footed ferret may also occur in the vicinity of the Base. The federal- and state-protected species are listed in TABLE 2-1.

Within Curry County, the state-protected bird that is most likely to occur is the Mississippi kite. In New Mexico, since the early 1960s, this kite summers regularly and breeds in the Clovis region. The birds frequent the golf course at Cannon AFB. Two other state-protected birds within Curry County that may occur, but not regularly in recent time, are the McCown's longspur and Baird's sparrow. No information is available on the McCown's longspur in New Mexico; however, Baird's sparrow occurs mainly in autumn during migration in the eastern plains and southern lowlands. Migrants appear as early as the first week of August and move further south by November. The species seems

to have declined in abundance throughout its range in the Southwest due to the loss of shrubby shortgrass habitats. State-protected birds known to occur infrequently are the bald eagle and the peregrine falcon. The bald eagle migrates and winters from the northern border of New Mexico to the Gila, lower Rio Grande, middle Pecos, and Canadian valleys. It is seen occasionally in summer and as a breeding bird, with nests reported in the extreme northern and western parts of the state. Winter and migrant populations appear to have increased with reservoir construction. The peregrine falcon is widely distributed but population numbers are low. The American subspecies breeds statewide in New Mexico, but mainly west of the eastern plains.

2.4 PREVIOUS SITE INVESTIGATIONS

No investigations concerning soil contamination have been conducted at the AOC-D site previously. According to the information provided by the Base and USACE, a pit existed at the site in mid-1950s which received demolition debris from several buildings at the site, and may have received unknown contaminants (organic or inorganic) or contaminant sources (e.g. drums).

**TABLE 2-1
FEDERAL- AND STATE-PROTECTED ANIMALS
POTENTIALLY OCCURRING IN THE VICINITY
OF CANNON AFB (CURRY COUNTY)**

Common Name	Scientific Name	Federal Status	State Status
<u>Birds</u>			
Mississippi kite	<u>Ictinia mississippiensis</u>		Endangered (Group 2)
Baird's sparrow	<u>Ammodramus baridii</u>		Endangered (Group 2)
Bald eagle	<u>Haliaeetus leucocephalus</u>	Endangered	Endangered (Group 2)
Peregrine falcon	<u>Falco perigrinus</u>	Endangered	Endangered (Group 1)
<u>Mammals</u>			
Black-footed ferret	<u>Mustela nigripes</u>	Endangered	Possibly Extinct

- Endangered (Group 1): Species whose prospects of survival or recruitment within the state are in jeopardy.
- Endangered (Group 2): Species whose prospects of survival or recruitment within the state are likely to become jeopardized in the foreseeable future.
- Possibly Extinct: Potentially no longer in existence in the state.

Source: Lee Wan and Associates 1990